English translation of the amended sheet of International Preliminary Examination Report

CLAIMS

1. Method of creating an electrically conducting bonding between a face of a first semi-conductor element (10, 32, 55) and a face of a second semi-conductor element (12, 34, 53) by means of heat treatment, consisting of:

- depositing at least one layer of material on said face of the first semi-conductor element and at least one layer of material on said face of the second semi-conductor element, these deposited layers combining during said heat treatment to form a layer that provides an electrically conducting bonding between the two faces,

- applying said faces one against the other, interposing said layers of deposited material,

- carrying out said heat treatment, characterized in that the layer of material (11, 15, 33, 37, 52, 57) deposited on said face of the first semi-conductor element and the layer of material (13, 16, 35, 38, 54, 58) deposited on said face of the second semi-conductor element are chosen in order to react in solid phase during the heat treatment and to form a mixture that is stable for a temperature higher than the heat treatment temperature for the first (10, 32, 55) and for the second (12, 34, 53) semi-conductor element respectively, the heat treatment not inducing any reaction product between the deposited materials and at least one of the semi-conductor elements.

2. Method according to Claim 1, characterized in that during the preliminary step, the thin film is bounded in a substrate (50) by a layer of micro-cavities (51) obtained by ionic implantation, the

CLAIMS

1. Method of creating an electrically conducting bonding between a face of a first semi-conductor element (10, 32, 55) and a face of a second semi-conductor element (12, 34, 53) by means of heat treatment, consisting of :

- depositing at least one layer of material on said face of the first semi-conductor element and at least one layer of material on said face of the second semi-conductor element, these deposited layers combining during said heat treatment to form a layer that provides an electrically conducting bonding between the two faces,

- applying said faces one against the other, with interposing of said layers of deposited material,

- carrying out said heat treatment, characterized in that the layer of material (11, 15, 33, 37, 52, 57) deposited onto said face of the first semi-conductor element and the layer of material (13, 16, 35, 38, 54, 58) deposited onto said face of the second semi-conductor element are chosen in order to react in the solid phase during the heat treatment and to form a temperature stable mixture with respect to the first (10, 32, 55) and the second (12, 34, 53) semi-conductor element, the heat treatment not inducing any reaction product between the deposited materials and at least one of the semi-conductor elements.

2. Method according to Claim 1, characterized in that the material of the layer deposited on the face of the first semi-conductor element is distinct from the material of the layer deposited on the face of the

second semi-conductor element, the heat treatment forming a mixture that does not induce any reaction product with the first and the second semi-conductor element.

3. Method according to one of Claims 1 or 2, characterized in that one of the layers of material is deposited with an excess thickness such that a part of this layer, in contact with the other layer of material combines with the other deposited layer of material in order to form said stable mixture, the other part of the layer deposited with an excess thickness, in contact with the semi-conductor element on which it is deposited, reacting during the heat treatment with this semi-conductor element in order to form a film with ohmic contact.

4. Method according to Claim 1, characterized in that a layer of oxide is provided between said deposited layers of material, the oxide being chosen in order to react with at least one material of said deposited layers, the thicknesses of the oxide layer and the layer of material with which the oxide reacts being such that the oxide formed is in the form of isolated precipitates which do not substantially harm the electrically conducting bonding.

5. Method according to Claim 4, characterized in that said layer of oxide is deposited on one of the deposited layers of material or on both of them.

6. Method according to Claim 1, characterized in that the first and second semi-conductor elements are

pressed one against the other during the heat treatment.

7. Method according to Claim 1, characterized in that the first semi-conductor element is SiC and the second semi-conductor element is SiC, the interposed layers comprising a layer of tungsten and a layer of silicon on said face of the first semi-conductor element and a layer of tungsten and a layer of silicon on said face of the second semi-conductor element, the mixture formed after the heat treatment comprising WSi_2.

8. Method according to any one of the preceding Claims, characterized in that, one of the semi-conductor elements being a thin film (32, 55), the method comprises a preliminary step consisting of defining this thin film as a superficial layer of a substrate, intended to be separated from the rest of the substrate.

9. Method according to Claim 8, characterized in that during the preliminary step, the substrate is formed by stacking a support (30), a sacrificial layer (31) and the thin film (32), the separation of the thin film from the rest of the substrate being obtained after creation of the bonding, by dissolution of the sacrificial layer (31).

10. Method according to Claim 8, characterized in that during the preliminary step, the thin film is bounded in a substrate (50) by a layer of micro-cavities (51) obtained by ionic implantation, the

separation of the thin film from the rest of the substrate being consecutive to the bonding heat treatment or to a specific heat treatment or to the application of mechanical forces or to the combination of a heat treatment and the application of mechanical forces.